Container and Vertical Gardening for Small Spaces

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Common Soil Seed Library Lecture Series

Container Gardening

- Closed System Gardening
- You must provide all the plant needs below soil level
- Need to consider:
  - soil,
  - water,
  - light,
  - and nutrients
- Soil organisms may need to be added if desired, or often available in organic soil mixes
Perks of Container Gardening

- You completely create or determine the soil mixture, allows one to grow any plant disregarding your location
- Avoid toxic or contaminated soil
- Grow tropicals or frost tender plants so they may be overwintered
- Maximize use of space, ie vertical gardening
- Segregate multiple varieties of plants for seed saving

The Container

- Must have drainage holes!
- Careful to not use something that will leach chemicals or harmful bacteria into the soil
- Avoid plastics when possible, LDPE & HDPE ok
- Careful with cinderblocks (toxic binding agent)
- GET CREATIVE!
Plastic Grow Bags

A few cents a piece, durable, good for tree seeds, or any plant really!
Soil Components

- Air 25%
- Water 25%
- Mineral Particles 45%
- Organic Matter 5%
- Organisms 10%
- Roots 10%
- Humus 80%

Soil Particle dimensions:
Clay < Silt < Sand

Organic Matter

- This is the most important component for home gardens and growing healthy plants
- This will retain moisture in the soil and is full of bioavailable nutrients for plants to use
- This is increased in soil by harboring natural biological life like earthworms and adding compost or mulches to garden spaces
- Needs water for biological processes, but also air so cannot become waterlogged
  - i.e. overwatering of plants kills them quickly
pH and Soil Chemistry

Rhizosphere

Roots breaking down soil into soluble forms
Mixing Soils

• Most plants like soil to be moist but not wet
  • If you grab a handful of soil and squeeze out water it is too wet
• Therefore a rich soil that will retain moisture yet have good drainage
• Measure in relative parts using a scoop, bucket or any container
  • Example: 1 part sand, 1 part compost, 2 part top soil

Soil Amendments

• There are many different materials that may be added to soil mixtures to give them different properties
• May lower pH of soil like coffee or pine needles
• May increase the organic matter for water retention or add sand to increase drainage
• Ask what the plant needs and go from there.
Amendments

- Perlite and vermiculite increase drainage
- Vermiculite will wet but perlite will not
- Compost, kelp meal, leaf mold all increase nutrients in soil
- Coir (coconut husk) or peat moss will increase water retention of soil

Organic Soil Amendments

- Compost
- Shredded tree bark
- Sphagnum peat moss
- Manure (cow/sheep/horse/rabbit)
- Leaf mold
- Wood ash
Biochar aka Charcoal

- Biochar is wood burned to a black porous state but not to ash.
- Used by people in agriculture for several thousand years
- Technically it is best made through a specific process of burning the wood called pyrolysis
  - Heating biomass in reduced oxygen
- Potent tool to fight climate change and grow amazing plants!
- Absorbs excess nutrients, the slowly releases them as wood is broken down
- Look up ‘terra preta’ from the Amazon!
Organic Fertilizers

• Fish Emulsion – nutrient solution as a fertilizer
• Kelp Meal – micronutrients from the ocean
• Epsom Salts – contains magnesium, great to be sprayed onto plants or for transplants
• Azomite – vitamin mix for soils
• And Many more...

• Can achieve long term soil nutrition through using compost, mulch and biochar in soil mixes!

General Potting Mix

• A ideal potting mix should be light or airy, long lasting and not break down or become compacted, retain moisture and contain available nutrients for the plants.

• 1 part coir, sand, and coarse vermiculite
• 2 part compost
• 1 cup of worm castings or plant food
Watering Schedule

- Water retention in the soil will depend on sun and wind exposure, and composition of soil
- Usually let the top of the soil dry slightly before watering, and test with finger before watering each time
- 95% of the time people kill plants by overwatering, will deprive roots of air
- If in doubt I will usually wait to water before I overwater container plants!
- What happens when you water wet soil???

Lighting Requirements

- Most plants like full sun, however many tolerate part shade or thrive in more shady conditions
- Cultivate to your environment, more sun plants if in full sun or vice versa
- South and east exposures of a house get more sunlight per day
- Leaf greens, Brassicas, beets, bean and peas all do well in shade or part shade!
Container Sizes and Repotting

• If in a container for a long time plants become root bound or have outgrown their pot

• Remove the plant, trim roots growing in a circular fashion with clean scissors, add a few inches of soil to a larger pot, add the plants with all roots pointing down, then fill over soil, lightly press in place and water briefly but not a soaking!

Container Design

• When designing a planted container utilize the full profile top to bottom

• Use a larger focal plant, smaller plants to cover bulk of area and shade soil, then have plants that will fall or drape over the front

• Or simply grow mixed herbs, etc
Possibilities

- Smaller tropical/fruit trees for containers
  - Citrus
  - Avocado
  - Pomegranate
  - Persimmon
  - Peach, Apple, Cherry
  - Bay Laurel
  - Etc.
Self Watering 5 Gallon Bucket

- Always water through this fill tube
- Lid keeps moisture in, rain water out
- Bucket 2
- Fill to the top with potting mix
- Bucket 1
- Drain hole on bucket 1 lets you know when the reservoir is full
- Cup to wick water to the plant
Vertical Gardens

• Cultivating smaller plants like greens or herbs in small containers oriented in a vertical fashion
• Maximize garden space, GO UP!
• Avoid soil borne pests or fungi
• Could be:
  • Racks or systems of small pots,
  • Gutters,
  • Precast stackable pots, or
  • Garden trellises and arbors
No garden? No problem.

Gutters
Potted Racks

Plant Pyramid
Stackable Pots (Mr Stacky)

Go Vertical Where Possible
Small Space Gardening

• Maximize number of plants through container gardening, use planting techniques to retain water and nutrients
• Utilize space above ground to shade plants below and get more plants off the ground
• Try to create shady spots or sunny spots or variety of growing conditions to provide for a range of different plants
• Get creative and learn from mistakes!

Herb Spirals

• Create a spiral shape with rocks, bricks, glass bottles, etc.
• The top will be drier than the bottom, and one side more shaded than the other
• Grow a variety of plants in a small space
Hugelkulture Mounds

• Layering and mounding of materials to retain soil moisture and maximize the growing area of a space!
• Large logs are surrounded by smaller logs and all is buried with soil then gardened
• All decomposes over time while retaining moisture in the wood
• Creates microclimates
Hugelkulture Cross Section

Keyhole Gardens

- A circular growing bed with a keyhole shape
- The center circle is chicken wire where compost is constantly added, leaching into and feeding the entire bed over time
- Duals as a compost pile and growing space
- Efficient and effective for small spaces!
Intercropping

- Maximizing use of space in garden
- Beneficial in retaining topsoil and mineralizing soil nutrients with increased roots growing
Unlimited Possibilities

At the End of the Day...

- Container gardening may be a challenge at first, but it is important to try, fail and learn!
- It allows anyone to garden, and in virtually any space
- It comes down to managing water and nutrient needs of the plant overtime
- Mitigate this by mixing your own soils, and then you know not only where your food comes from but where your soil comes from!
Take stock at home...

• Note the intensity and duration of light in your area.
• Define walking paths and where you want planting to occur...can you do vertical planting, where and how many containers, etc.
• Limit chemical uses and find organic alternatives
• Make a compost pile or worm bin for indoors
• Always limit patches of bare soil in the garden as they will be baked by the sun and dehydrate quickly
• Plant about 1/3 flowers and actively invite pollinators
• Every little bit counts, so collectively a small action becomes large!

Online Resources

• Nebraska Statewide Arboretum
• Wikipedia
• Univ. of Illinois Extension information (http://extension.illinois.edu/containergardening/)
• Container Gardening Online (http://containergardening.about.com/)